



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,791	12/31/2001	Toshiyuki Kaeriyama	TI-29135	2971

7590 11/24/2004  
Charles A. Brill  
Texas Instruments Incorporated  
MS 3999  
P.O. Box 655474  
Dallas, TX 75265

EXAMINER

JOLLEY, KIRSTEN

ART UNIT PAPER NUMBER

1762

DATE MAILED: 11/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/038,791

Applicant(s)

KAERIYAMA ET AL.

Examiner

Kirsten C Jolley

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3,12-15 and 18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,12-15 and 18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendments*

1. The obviousness-type double patenting rejections set forth in the prior Office action have been withdrawn in response to Applicant's amendments.
2. The 35 USC 102 and 103 claim rejections over the prior art of Miller et al. and Peterson et al. have been withdrawn in response to Applicant's amendments requiring "distributing said material using ultrasonic energy" because there is no teaching or suggestion that ultrasonic energy may be used to distribute coating material over the micromechanical devices of the references, as argued by Applicant. It is noted that Miller et al. teaches that spinning unexpectedly does not cause damage of the structures because the pressures on either side of a mirror are even (paragraph [0042]), however there is no indication that ultrasonic energy would not cause damage to the structures. Peterson et al. teaches that the use of its protective coating allows ultrasonic wirebonding to occur without damage due to mechanical vibrations or to the MEMS devices (col. 9, lines 26-28), therefore Peterson et al. teaches away from using ultrasonic energy to apply/distribute a coating material over an unprotective device.

The claims remain rejected over the prior art of Kao et al., taken in view of the newly-cited Chiu reference, for the reasons set forth below.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 12-14, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kao et al. (US 5,923,995) in view of Chiu (US 5,858,475).

Kao et al. discloses a method comprising the steps of: forming at least two micromechanical devices 310 on a common substrate 300 (col. 4, lines 23-38 and Figure 2A); applying a liquid water-soluble overcoat material to the micromechanical devices to form first protective layer 320 (col. 4, lines 39-45 and Figure 2B); separating said common substrate to separate said devices by sawing (col. 5, lines 19-22 and Figure 2D); and removing the overcoat from said micromechanical devices (col. 5, line 64 to col. 6, line 37 and Figure 2E).

Kao et al. lacks a teaching of using ultrasonic energy to distribute the coating material. Kao et al. teaches that first protective layer may be applied by "any conventional process known by those of ordinary skill in the art such as spin coating" (col. 4, lines 39-43). It is noted that spin coating in combination with ultrasonic energy is a known conventional process for applying liquid coatings to substrates having non-uniform surface structures. Chiu is cited for its teaching that spin coating does not necessarily form uniform, planar coatings when applied to an uneven substrate. Chiu teaches a method of applying a liquid coating to a substrate having a high topography by spin coating and then using ultrasonic energy to vibrate the coated substrate so that the coating flows better and flows from the higher sections to the lower sections, resulting in a coating that fills the voids and valleys of the substrate. It would have been obvious for one having ordinary skill in the art having seen the references of Kao et al. and Chiu in combination to have used the spin coating followed by ultrasonic vibration method of Chiu to apply the

Art Unit: 1762

protective overcoat material in the method of Kao et al. since the substrate of Kao et al. has an uneven topography and one skilled in the art would have desired a coating which forms a planar layer over the entire substrate, including in the valleys and voids, and because Kao et al. teaches that *any* conventional process known in the art may be used. Further, one skilled in the art would have expected successful results since Kao et al. teaches agitating or circulating water on the coated structures to eventually remove the overcoating (col. 6, lines 28-36), therefore one skilled in the art would have expected that Kao et al.'s MEMS structures are strong enough to withstand ultrasonic vibrations.

As to claim 12, the protective layer is inherently cured in order to allow the saw to "cut" it (liquid layers cannot be cut). As to claim 18, the removal step of washing with water meets the limitation of an isotropic etch.

As to claims 13-14, Kao et al. lacks a teaching of the methods used to cure first protective coating layer 320. The Examiner notes that heating and ultraviolet light are two well known and commonly used means for curing water-soluble coatings in the coating art. It would have been obvious for one having ordinary skill in the art to have performed the curing of first protective coating material in Kao et al.'s process by heating or ultraviolet light with the expectation of successful results since such is well known in the art.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kao et al. in view of Chiu as applied to claim 1 above, and further in view of Johnson (US 6,207,346).

Kao et al. is applied in view of Chiu for the reasons discussed above with respect to claim

1. Kao et al. lacks a teaching of the coating material used to form the water-soluble first

Art Unit: 1762

protective coating layer 320. One skilled in the art would have been motivated to look to the prior art for water-soluble coating compositions that may be used as first protective layer 320. The Examiner notes that photoresist coatings are well known in the art for providing protective coatings to substrates having MEMS devices thereon. (See the "references cited" section below for exemplary references teaching use of photoresist resins as protective coatings on wafers having MEMS devices thereon.) Johnson et al. is cited as being directed to a waterborne (and thus water-soluble) photoresist composition that may be used as a protective coatings (col. 1, line 12). The composition of Johnson et al. comprises urethane acrylate resin. It would have been obvious for one having ordinary skill in the art to have used the protective photoresist composition of Johnson et al. as protective coating layer 320 in the method of Kao et al. with the expectation of successful results since Kao et al. is not limiting as to the composition that may be used as long as it is water-soluble and since photoresists are known protective coatings for sawing/dicing of substrates having MEMS devices thereon.

### *Conclusion*


6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Akram et al. (US 5,609,995) is cited for its teaching of applying a coating by spin coating and then vibrating the substrate in order to fill voids in the coating due to the uneven substrate surface.
7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kirsten C Jolley whose telephone number is 571-272-1421. The examiner can normally be reached on Monday to Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P Beck can be reached on 571-272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Kirsten C Jolley  
Primary Examiner  
Art Unit 1762

KCJ